Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_

**Cellular Respiration Lab**

Ms. Ottolini, AP Biology

**Objectives**

*Quantify oxygen consumption rates in germinating peas under different conditions*

*Predict the effect of germination state on the rate of cell respiration*

**Materials:**

50 germinating pea seeds,  50 dry seeds,  100 glass beads,  3 respirometer vials, Weights for vials, 3 stoppers,  1 ml graduated pipets, absorbent cotton, nonabsorbent cotton, 1 round wood stick,  3 pieces of paper towel, marking pen, water bath, 100 ml graduated cylinder, thermometer, masking tape, stopwatch or clock, water.    Dropper Bottle of 15% KOH

*Remeber KOH is a strong base that is corrosive and must be handled with care. Tell the teacher if any of it gets on you. Flush out area with water for 10 minutes.*

**Pre-lab:**

Your teacher will show you how to properly assemble a respirometer and how to use one. Assembling the respirometer is crucial for the success of this lab. So pay attention carefully.

**Simplified Procedure:**

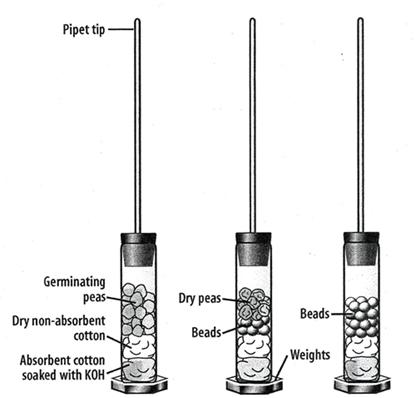
1. Gather materials.
2. Assemble respirometers (Dried Peas, Germinating Peas, Beads, and Worm)
3. Equilibrate Respirometers for 7 minutes (what does equilibrate mean?)
4. Slowly submerge the respirometers in the water.
5. Record the bubble placement at time 0 min, 5 min, 10 min, all the way up to 20 min.
6. Clean up lab and get ready to analyze the data!

**Important Equations to Know:**

CO2 + 2KOH --> K2CO3 + H2O

C6H12O6 + 6O2 🡪 6CO2 + 6H2O

**Set-Up:**

***Respirometer 1* -** 25 Germinating peas, Cotton soaked with KOH, dry cotton

***Respirometer 2*** - Dried Peas, Cotton soaked with KOH, dry cotton, glass beads

***Respirometer 3* -** Glass beads only, Cotton soaked with KOH, dry cotton

**Data Tables:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Respirometer 1 | 0 minutes | 5 minutes | 10 minutes | 15 minutes | 20 minutes |
| Reading mL |  |  |  |  |  |
| Δ Volume mL | N/A |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Respirometer 2 | 0 minutes | 5 minutes | 10 minutes | 15 minutes | 20 minutes |
| Reading mL |  |  |  |  |  |
| Δ Volume mL | N/A |  |  |  |  |

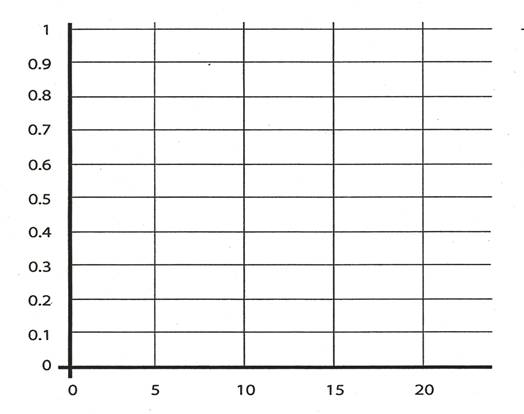
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Respirometer 3 | 0 minutes | 5 minutes | 10 minutes | 15 minutes | 20 minutes |
| Reading mL |  |  |  |  |  |
| Δ Volume mL | N/A |  |  |  |  |

**Graphing Your Data:**

*Plot the independent variable on the X axis (time), and the dependent variable on the Y axis (change in volume).*

*Graph a line for germinating peas, non-germinating peas, and bead*

*Make sure to include ALL elements of a properly-designed graph*



**Analysis**

1.   State a hypothesis that relates to the state of seed germination that is being tested by this lab exercise.

2.  Calculate the RATE of oxygen consumption for the germinating seeds and non-germinating seeds.  Rate can be calculated by determining the SLOPE of the line from your graph above.

3.  In this lab exercise, what is the purpose of the ….

* Beads
* KOH
* Respirometer

4.  Explain why the water moved within the pipet.